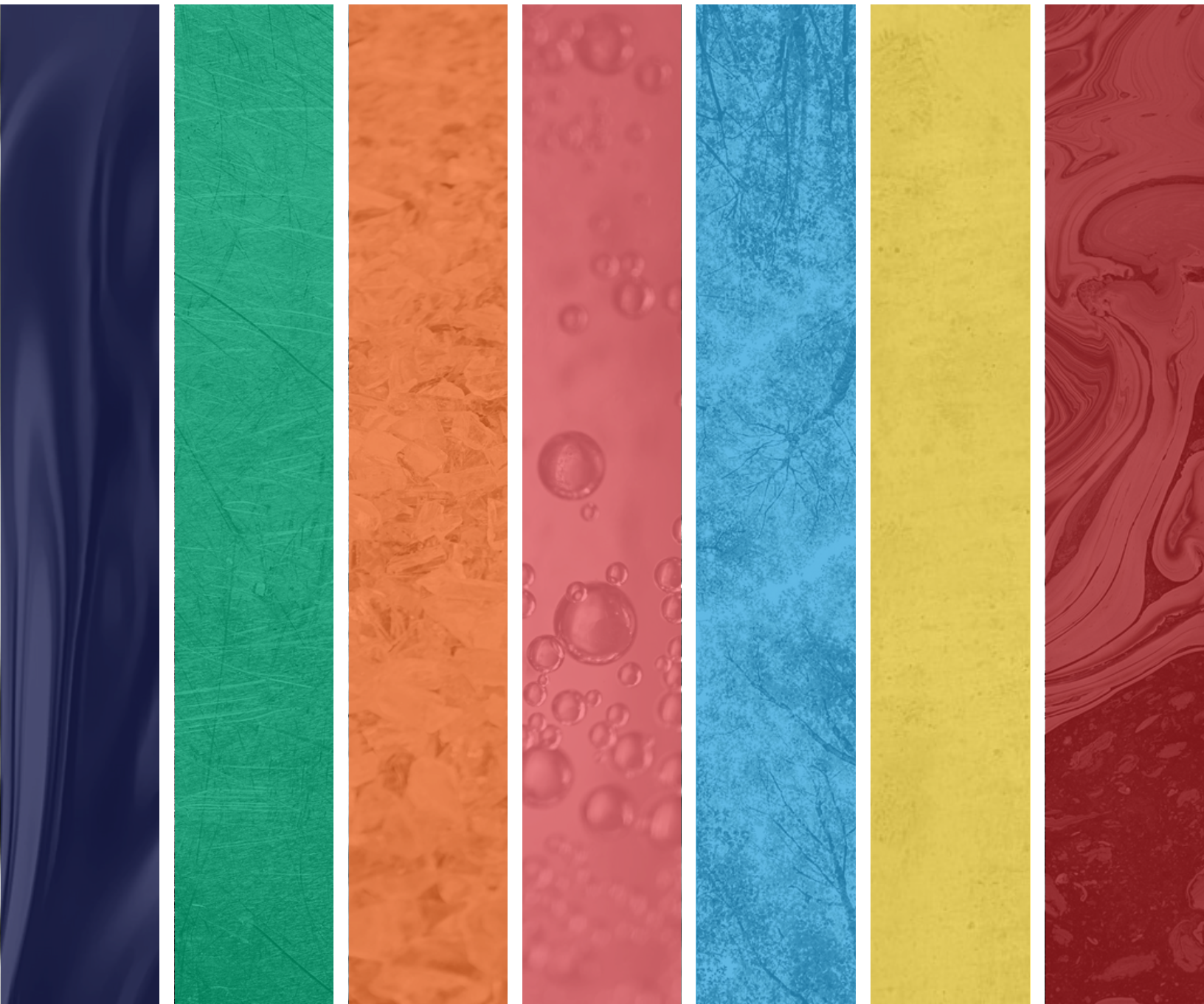
Standards



2.5 Standards

Overview

Standards "specify levels of performance [that] businesses or equipment must achieve."[163] Standards, such as those targeting appliances, commercial and industrial equipment, and vehicles, have a global track record of successfully reducing energy and emissions.[164] In the United States, the EPA's National Ambient Air Quality Standards (NAAQS) have successfully reduced criteria air pollutants by 73 percent since 1980.[165] Standards can also accelerate the development and deployment of new technologies: for

example, from 2000 to 2015, state-level renewable portfolio standards (RPS) drove 60 percent of new renewable energy capacity additions in the United States. [166]

Standards can be technology- or performance-based in design. Technology standards require the use of a specific technology or process to achieve energy and emissions goals, while performance standards require achievement of a specific benchmark without prescribing the technological choice, providing room for innovative approaches. A tradeable performance standard would include a crediting system, introducing more flexibility for compliance and an incentive for outperforming the benchmark. [167]

Industrial standards can be tailored to meet unique aspects and challenges of decarbonizing specific subsectors. They could be developed to target a specific type of facility or product (e.g., cement), manufacturing process (e.g., boilers), or fuel. [168] Due to the variety of processes and products that underlie the manufacturing sector, and limited foresight into all possible technology solutions for reducing emissions, it may be prudent for states to adopt performance standards that maximize flexibility and minimize cost. A tradeable performance standard could serve as an alternative to carbon pricing policies, forgoing a direct price on pollution but retaining the benefits of cost and flexibility. [169]

State actions
In theory, states can develop standards to address all pillars of industrial decarbonization, either through explicit design considerations (e.g., a technology standard for industrial electrification) or a flexible performance-based standard that accommodates all pillars (e.g., a broad emissions standard). However, outside of the economy-wide emissions requirements dictated by California's and Washington's cap-and-trade programs, few examples that directly target industrial sources currently exist.

- *Efficiency*
    - Efficiency (and Emissions) Standards: **Colorado's** Greenhouse Gas Emissions and Energy Management for Manufacturers (GEMM) regulation provides an approach where large, Energy-Intensive Trade-Exposed (EITE) manufacturers conduct a "GHG Best Available Emissions Control Technology (GHG BAECT)" and "Energy Best Management Practices" audit every five years and use the results to demonstrate they are controlling their GHG emissions. If they can demonstrate they are utilizing GHG BAECT, the facility is required to reduce emissions by an additional five percent. If they are not using GHG BAECT, the facility must implement strategies to meet the GHG BAECT emissions rate or be subject to further GHG regulation. [170] **Oregon's** Climate Protection Program regulates GHG emissions, including process emissions, from highly emitting new and existing industrial facilities. The program requires these entities to conduct "best available emissions reduction assessments." [171] **Louisiana** proposed developing both industry efficiency standards and a net-zero industry standard in its climate action plan. [172]
    - Circularity and Recycling Standards: Many states regulate their waste management to penalize the disposal of valuable materials and preserve limited landfill space. **Massachusetts**, for example, requires recycling for ten categories of materials, including containers, construction waste, and mattresses. [173] In 2021, **Maine** became the first state to enact an extended producer responsibility (EPR) law for paper and plastic packaging. [174] EPR is a concept that shifts the burden of managing a

product's end-of-life from the consumer to the producer. EPR can incentivize manufacturers to design products that are easier to reuse and recycle.[175] **Oregon**[176] and **California**[177] each passed related EPR legislation while four other states advanced similar bills.[178]

- *Low-carbon fuels & feedstocks*
    - Clean Fuel Standards: **California**,[179] **Oregon**,[180] and **Washington**[181] have adopted clean fuel standards (CFS) to increase the use of low-carbon fuels in the transportation sector. However, these standards can also support the growth of renewable fuels industries and lower the carbon intensity of fossil fuels consumed by industrial facilities. CFS can also incentivize the use of CCUS, as is the case with California's Low Carbon Fuel Standard (LCFS), which credits projects by transportation fuel producers that deploy CCUS.[182]

- *Carbon capture, utilization, and storage (CCUS)*
    - Carbon Management Standards: States play an important role in creating a policy environment that ensures the long-term sequestration and climate benefits of CCUS. These policies include setting standards that clarify the siting, monitoring, and liability of captured carbon transportation and storage projects.[183] Examples include passing laws to define ownership of carbon dioxide and its pore space (**Montana**, **North Dakota**, and **Wyoming**) and establishing trust funds to ensure states can finance the long-term monitoring and management of sequestered carbon (**Kansas**, **Louisiana**, **Montana**, **Texas**, and **Wyoming**).[184] **West Virginia** recently enacted a bill that defines liability and creates sequestration regulations for permitting, injection well drilling, and project completion.[185] In 2018, **California** adopted a CCS Protocol as part of amendments to its LCFS to describe requirements transportation fuel producers must meet for a CCS project to be recognized in that program.[186]

- *Procurement*
    - Embodied Emissions Standards: The *Buy Clean **California** Act* requires the state to establish and publish "maximum acceptable global warming potential (GWP) limits" for select construction materials, which were finalized in January 2022. Starting in July 2022, all covered materials used in public construction projects must prove they meet the applicable GWP limit.[187] A **Colorado** bill enacted in 2021 calls for the development of similar GWP standards to support a 'buy clean'-type program for the state's buildings and transportation projects.[188] See ***Section 2.6: Supporting Policies and Actions*** for more information on procurement policies.

Gaps and opportunities
Some states are in the early stage of developing standards that address material efficiency, CCUS, and embodied emissions, but little work has advanced to comprehensively target electrification and other fuel-switching opportunities. Standards that accommodate the needs of small- and medium-sized manufacturers and lighter industry are also missing. Various research groups have proposed novel policy concepts

for standards that have no real-world counterpart, but states could serve as valuable proving grounds for them. For example:

- *Efficiency*
    - Circularity and Recycling Standards: These policies would increase material efficiency through "circular economy" principles, which references a portfolio of solutions to maximize the useful life of manufactured goods and reduce waste and the need for virgin materials. These would expand existing recycled content standards and recycling incentives to cover major industrial materials and incorporate concepts like EPR and material recirculation.[189, 190] **Massachusetts** released a *2030 Solid Waste Master Plan*, recommending regulations and strategies to reduce disposal to landfill by 90 percent by 2050.[191]

- *Electrification, Low-carbon fuels & feedstocks*
    - Clean Heat Standards: Also known as "thermal renewable portfolio standards"[192] or "low-emissions heat portfolio standards,"[193] clean heat standards would establish an emissions performance standard for industrial heat that could be met by a variety of sources, including (but not limited to) renewable electricity, low-carbon hydrogen, biofuels, solar thermal, geothermal, and other innovative solutions. Groups have suggested these standards be modeled after renewable portfolio standards to help scale the supply of low-carbon industrial heat sources, just as RPS approaches accelerated the supply of wind and solar electricity. States like **New Hampshire** and **Massachusetts** have added renewable thermal as a qualifying resource under their existing RPS[194] or as a complementary standard,[195] while **Wisconsin** proposed adopting a renewable thermal standard in its recent clean energy plan.[196]

- *Carbon capture, utilization, and storage (CCUS)*
    - Carbon Management Standards: States have an opportunity to accelerate CCUS project permitting while also creating risk-based and environmentally protective safety standards for carbon storage. One avenue is obtaining primacy over Class VI wells, which EPA currently administers in all but two states (**North Dakota** and **Wyoming**).[197] EPA's Class VI well requirements protect drinking water sources by regulating the siting, monitoring, and operation of geologically sequestered carbon.[198] However, EPA's Class VI permitting can take years and its requirements are floors that can be exceeded by state standards.[199] Four states (**Arizona**, **Louisiana**, **Texas**, and **West Virginia**) are in the process of applying for primacy, although this approval process may also take many years.[200] Pore space ownership is another area that requires state attention, given the variability and complexity of property rights in the United States.[201]

- *Procurement*
    - Clean Product Standards: Clean product standards (CPS) would establish a market-wide emissions standard for industrial products, essentially applying the global warming potential (GWP) or embodied emission standard of a Buy Clean policy to cover *all* products sold within

a certain jurisdiction, not just the products purchased by state governments.[202] A CPS could be viewed as a natural expansion of a Buy Clean policy: after government creates the initial market for lower-carbon products and develops the supporting infrastructure (e.g., data, monitoring and evaluation), it can create a CPS to bring the rest of the market onboard to incentivize deeper and broader emissions cuts from manufacturers. It could also be designed to deal with carbon leakage by applying to both imports and exports.[203] World Resources Institute (WRI) has explored what a tradeable CPS would look like for the cement and steel industries.[204, 205]

- Embodied Emissions Standards: There may be opportunities to layer policies at the state and local level to address the embodied carbon of different materials. For example, local or state building codes could incorporate embodied emissions standards for construction materials, although only one jurisdiction (Marin County, California) has implemented this concept to date.[206] In theory, however, material regulations could be integrated into structural building codes.[207, 208] In addition, at least 20 cities and municipalities have adopted embodied carbon policies across the United States.[209]

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